INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

DESTINATION: K-C CS

FAX NUMBER: 214-830 6847

ATTENTION: K. Hizer

Telephone/Location: x 6844

NUMBER OF PAGES: 1 OF ~~3~~4

Confidential Yes ___ No ___

Urgent Yes ___ No ___

COMMENTS:

Billing explanation

FROM: T. O'Flaherty

DATE: Apr 26

INPUT
Project Charge Code: ________

CATALOG NO. ☐☐☐☐☐☐☐

INPUT

INPUT

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Fax (201) 801-0441

FAX TRANSMITTAL FORM

DESTINATION: Cal

FAX NUMBER:

ATTENTION: Renee

Telephone/Location:

NUMBER OF PAGES: 1 OF 4

Confidential Yes ___ No ___

Urgent Yes ___ No ___

COMMENTS:

FYI re KCCS

FROM: TR

DATE: Apr 26

INPUT
Project Charge Code:

CATALOG NO. ☐☐☐☐☐☐☐

INPUT

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

April 26, 1991

Ms. Katherine Hizer
KCCS

Via Fax (214) 830-6847

Dear Ms. Hizer:

This is in reference to our telephone conversation regarding INPUT's billings for consulting assistance.

- The contract is my letter to Jim Huff dated December 19, 1990. (My signed copy was faxed from our California office, so it is hard to read; I have enclosed an original.)
- The time on the invoice was spent on the following activities:
  - Preparation for meeting (December 19 and part of December 20)
  - Travel to and from Dallas (December 20 and 21, including three hour delay on December 21)
  - Meeting in Dallas (December 21)
  - Follow-up questions and research (December 27, January 9)

If you have any additional questions, please call.

Sincerely,

Thomas O'Flaherty
Vice President

TOF:ms

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

December 19, 1990

Mr. James Huff
President
Kimberly-Clark Computer Services
Dallas, TX

Via Fax 214-830-6848

Dear Jim:

I received a copy of your non-disclosure agreement, have signed it and am returning a copy.

As we agreed verbally, I will provide per diem consulting services at the rate of $1,500 per eight hour day (on a pro rata basis including travel time). If other personnel are involved their billing rates will be agreed to beforehand. Associated expenses (largely travel) are additional and, if incurred by INPUT, will be billed at cost.

I look forward to meeting you and your staff on Friday.

Sincerely,

Thomas O'Flaherty
Vice President

Accepted by:
Kimberly-Clark Computer Services

Name ______________________

Title ______________________

Date ______________________

Proposal

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

December 19, 1990

Mr. James Huff
President
Kimberly-Clark Computer Services
Dallas, TX

Via Fax 214 830 6818

Dear Jim:

I received a copy of your non-disclosure agreement, have signed it and am returning a copy.

As we agreed verbally, I will provide per diem consulting services at the rate of $1,500 per eight hour day (on a pro rata basis including travel time). If other personnel are involved their billing rates will be agreed to beforehand. Associated expenses (largely travel) are additional and, if incurred by INPUT, will be billed at cost.

I look forward to meeting you and your staff on Friday.

Sincerely,

Thomas O'Flaherty
Vice President

Accepted by:
Kimberly-Clark Computer Services

James D Huff
Name

President
Title

12/20/90
Date

Proposal

INPUT

1280 Villa Street, Mountain View, CA 94041 (415) 961-3300
Telex 171407 Fax (415) 961-3966

FAX TRANSMITTAL FORM

DESTINATION: NJ

FAX NUMBER: ______

ATTENTION: Tom

Telephone Number/Location ______

NUMBER OF PAGES: 1 OF 2

Confidential Yes ✓ No ___

Urgent Yes ✓ No ___

DESCRIPTION: KCS wants itemized statement to back up this invoice. Message left on voicemail was hard to hear through all the static but the person this info should be sent to is

Kathy Sizer Phone (214) 830-6844
Fax (214) 830-6847

FROM: Renee

DATE: 4/24/91

INPUT
Project Charge Code: ______

FILE: ___CHRON ___CONTACT ___OTHER

Specify: ______

Re-send

INPUT

[illegible]

[illegible]

INVOICE

INPUT

FEDERAL ID# 94 2385874

1280 Villa Street Mountain View, CA 94041 (415) 961-3300
Telex 171407 Fax (415) 961-3966

ATTENTION: **Accounts Payable**

TO

KIMBERLY CLARK COMPUTER SYS.
Jim Huff
600 E. Las Colinas Boulevard
Irving, TX 75039

(214) 830-6800

DATE	03/01/1991
INVOICE #	110901
PROJ CODE	YGEN
SALES ORDER #	111103
PURCHASE ORDER #	

ORDER DESCRIPTION		AMOUNT
PROFESSIONAL FEE FOR CUSTOM PER DIEM CONSULTING 28 HOURS @ $1,500 PER 8 HOUR DAY.	$4,200.00	
DEC 19 2.0HRS DEC 20 7.5 HRS DEC 21 15.0HRS DEC 27 2.0 HRS JAN 9 1.5HRS		
EXPENSES (HOTEL & GROUND TRANSPORTATION)	218.60	
TOTAL	$4,418.60	

AMOUNT INVOICED	$ 4,418.60

Thank You!

INV 6/88

I N V O I C E

INPUT®

INPUT FEDERAL ID# 94-2385674

1280 Villa Street Mountain View, CA 94041 (415) 961-3300
Telex 171407 Fax (415) 961-3966

ATTENTION: Accounts Payable

TO

KIMBERLY CLARK COMPUTER SYS.
Jim Huff
600 E. Las Colinas Boulevard
Irving, TX 75039

(214) 830-6800

DATE	03/01/1991
INVOICE #	110901
PROJ. CODE	YGEN
SALES ORDER #	111103
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AMOUNT INVOICED	$ 4,418.60

Thank You!

INV 6/88

```
*******************************************************************
                                                           P.01  *
                                                                 *
                        TRANSACTION REPORT                       *
                       ____________________ MAR-11-91 MON 10:01  *
                                                                 *
*    DATE   START          RECEIVER      TX TIME  PAGES  NOTE    *
*  ______________________________________________________________*
*                                                                *
*   MAR-11 10:00 12148306848               1'43"     3     OK    *
*                                                                *
*******************************************************************
```

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

DESTINATION: KCSS, Dallas, Texas

FAX NUMBER: 214-830-6848

ATTENTION: Mr. James Huff

Telephone/Location: ________

NUMBER OF PAGES: 1 OF 3

Confidential Yes __ No __

Urgent Yes __ No __

COMMENTS: ________

FROM: Thomas O'Flaherty

DATE: 3/11/91

INPUT
Project Charge Code: ________

INPUT®

Parsippany Place Corporate Center, Suite 201, 959 Route 46 East, Parsippany, NJ 07054 (201) 299-6999

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

March 8, 1991

Mr. James Huff
KCSS
Dallas, Texas

Via Fax (214) 830-6848

Dear Jim:

This will confirm our conversation concerning INPUT performing a market research study on the CSP market.

INPUT will perform the following:

- Prepare a questionnaire with KCSS staff
- Test the questionnaire by telephone
- Conduct 40 interviews, 4 face-to-face and the remainder by telephone
- Tabulate and analyze the information
- Prepare a presentation of the findings and present them to KCSS in Dallas

As an incentive to participate, respondents will receive a summary of findings; this summary will be reviewed with KCSS before being released so as not to make public any critical information.

KCSS will receive copies of all completed questionnaires. If KCSS wishes to make sales contact, INPUT will serve as an intermediary.

INPUT can begin work within one week of project authorization. INPUT anticipates that the study will take six weeks to complete.

The professional fee will be $15,000. Half is payable upon project authorization and the remainder upon completion of the study. Out-of-pocket expenses (travel, telephone, production costs) will be billed at cost and are expected to be approximately 15% of the professional fee.

An additional 20 telephone interviews would increase the professional fee by $3,500.

Please signify authorization by signing below.

Sincerely,

Thomas O'Flaherty
Vice President

TOF:ms

AUTHORIZATION

To authorize the project as specified, please sign and return one copy of this proposal, along with the initial fee. Upon acceptance by INPUT, a countersigned copy of the proposal will be returned to KCSS.

AUTHORIZED BY:
KCSS

Name ____________________

Title ____________________

Date ____________________

ACCEPTED BY:
INPUT

Name ____________________

Title ____________________

Date ____________________

K-CCS
K-C CSP/ADE

What The Experts Say About CSP

- Gartner, Yankee, Input

  "Shelfware" - 80% Of Current Licenses
  Are Not Used

  CSP Is Hard To Use

  There Are Few CSP Utilities

  There Are No Clear CSP Development Standards

  CSP Is A Weak Link In The AD/Cycle Strategy

- Confirmed By Independent Survey

Univ of Dallas
- confirmed

What The Experts Predict For CSP

- **5 Years Behind DB2** CI
  26.5% Market Share for DB2
  6.5% Market Share for CSP

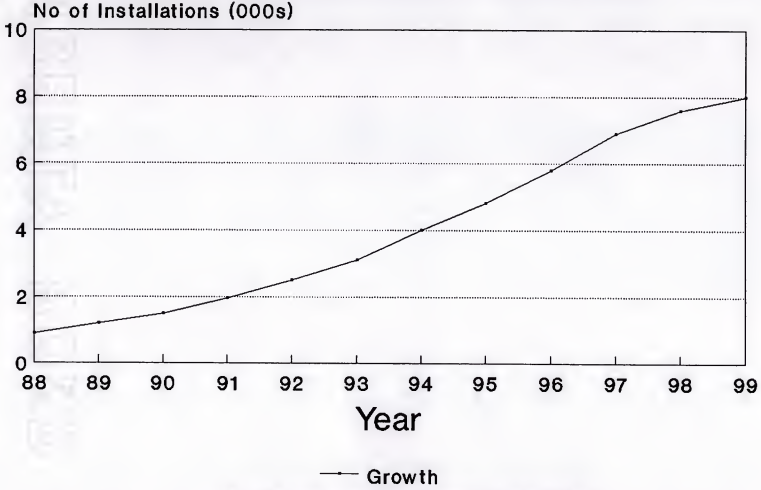
Gartner

- **CSP Install Base Increases 20% - 30% CAGR**

Dr Adam Rinn

- **Market Share For CSP Well Below DB2**
  DB2 - 55% to 60%
  CSP - 30% to 35%

CSP Projected Growth

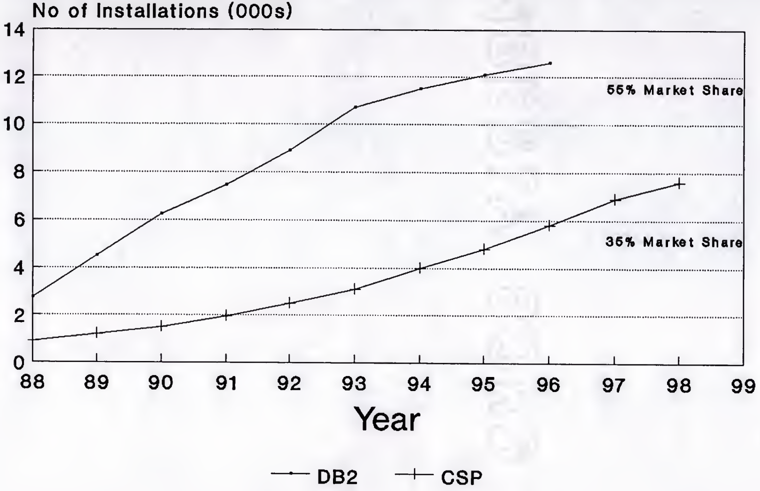


1500 Licenses At The End Of 1990, 80% Unused

Projected 30% CAGR

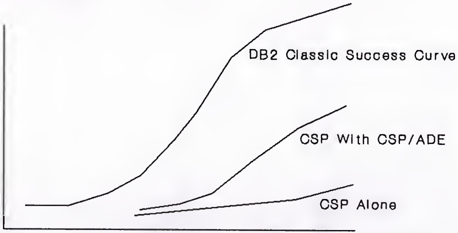
Projected 35% Market Share (1998 Top Out)

CSP vs. DB2 Projected Growth



K-CCS Solution

- Dramatically Increase Use Of Current CSP Licenses
- Accelerate Sales Of CSP
- Increase Market Share Of CSP
- Decrease Time To Achieve Maximum Market Share
- K-C CSP/ADE



K-C CSP/ADE

A CSP Application Development Enabling Tool

MODELS

FUNCTIONS

FOUNDATION

K-CCS Expertise

- **IAS - DB2 Enabling**
- **Code Generator Experience**
- **Application Development Experience**
- **K-C Model Experience**
  - 70% of 2.5 Million Lines Of Code Modeled
- **"K-C ADM"** like ADE
  - K-CCS Code Generation Productivity Product
  - Supports "Analysis/Design & Produce"

IBM's CSP Code Generator Issues

1. Performance
2. Functionality
3. Environment Administration

IBM's AD/Cycle Implementation Issues

1. **Standards Administration** (e.g., CUA, CPI)
2. **Application Development Platform Migration** (e.g., 3270/MF to OS/2 PWS)
3. **Application Development Discipline**

Solutions To Issues

CSP Issue #1

Performance

Solution

IBM's CICS Cobol Generator ✓

Solutions To Issues

CSP Issue #2

Functionality

NO High Level Language Support
(e.g., Date, String, Calc)

Solution

K-C CSP/ADE "Functions" = ?
(39 Functions Supported)

Solutions To Issues

CSP Issue #3

Environment Administration

MSL / ALF Management

~~Library~~ Svcs

Library - Check in & out

Solution

K-C CSP/ADE "Foundation"

Manage Check-In and Check-Out

Solutions To Issues

AD/Cycle Issue #1

Standards Administration
CUA, CPI

Solution

K-C CSP/ADE "Models"
Demonstration System
CSP Model Maps

Implemented

?

Solutions To Issues

AD/Cycle Issue #2

Application Development Platform Migration
Cobol Structured Programming
vs.
CSP List Orientation Programming
vs.
CSP Structure Chart Icon Programming
vs.
CASE Application Generation ← ?

Solution

K-C CSP/ADE "Models"
Standard Programming Objects Across All Platforms

Solutions To Issues

AD/Cycle Issue #3

Application Development Discipline
No Bridge From Logical Business Requirements to the CSP Technical Specification

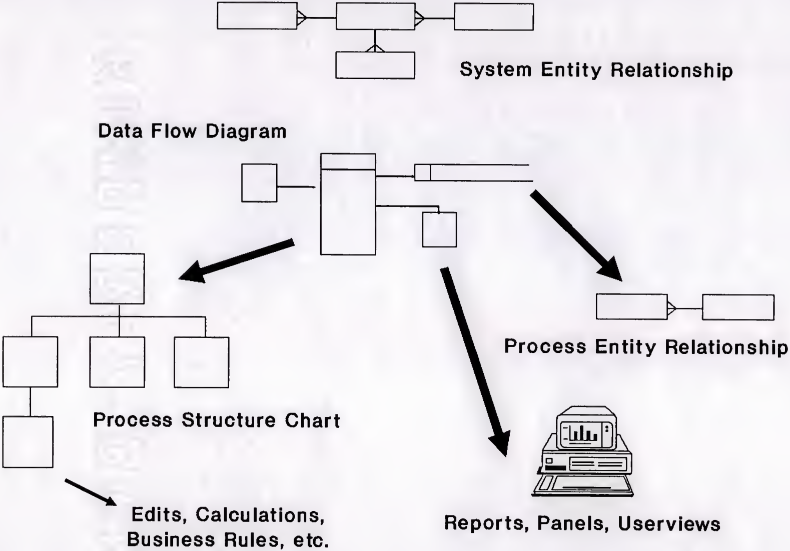
- CSP/AD - first step
- Statement of direction

Solution

K-C CSP/ADE "Models"
Use Pre-defined Code
or
Use Pre-defined Action Diagrams

fill in blanks +

Logical Design



System Entity Relationship

Data Flow Diagram

Process Entity Relationship

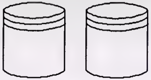
Process Structure Chart

Edits, Calculations,
Business Rules, etc.

Reports, Panels, Userviews

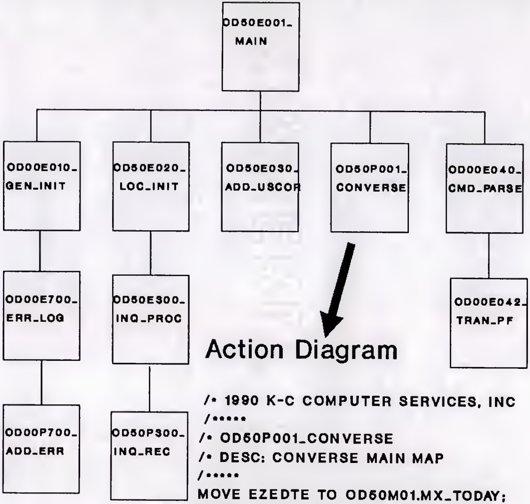
Technical Design

Create DB2 Tables



CSP MAPS

Technical Structure Chart or Psuedocode



OD50E001_
MAIN

OD00E010_
GEN_INIT

OD50E020_
LOC_INIT

OD50E030_
ADD_USCOR

OD50P001_
CONVERSE

OD00E040_
CMD_PARSE

OD00E700_
ERR_LOG

OD50E300_
INQ_PROC

OD00E042_
TRAN_PF

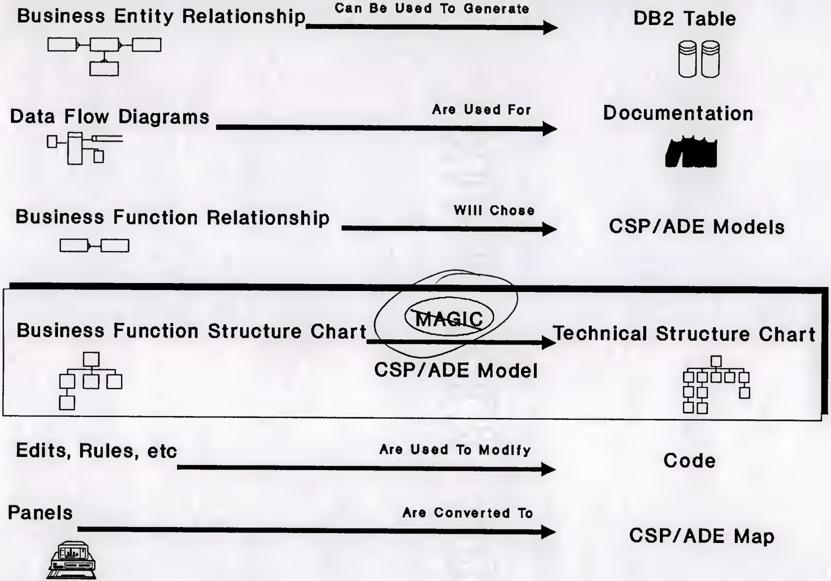
OD00P700_
ADD_ERR

OD50P300_
INQ_REC

Action Diagram

```
/* 1990 K-C COMPUTER SERVICES, INC
/*****
/* OD50P001_CONVERSE
/* DESC: CONVERSE MAIN MAP
/*****
MOVE EZEDTE TO OD50M01.MX_TODAY;
MOVE EZETIM TO OD50M01.MX_TIME;
CONVERSE OD50M01
```

Logical / Technical Design



Business Entity Relationship — Can Be Used To Generate → DB2 Table

Data Flow Diagrams — Are Used For → Documentation

Business Function Relationship — Will Chose → CSP/ADE Models

Business Function Structure Chart — ~~MAGIC~~ → Technical Structure Chart

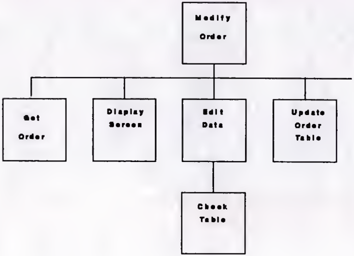
CSP/ADE Model

Edits, Rules, etc — Are Used To Modify → Code

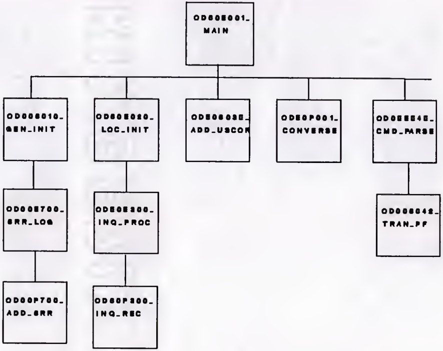
Panels — Are Converted To → CSP/ADE Map

Magic
CSP/ADE Solution

Business Function Structure Chart


Modify Order
Get Order
Display Screen
Edit Data
Update Order Table
Check Table

Technical Structure Chart


OD80E001_ MAIN
OD80E010_ GEN_INIT
OD80E020_ LOC_INIT
ODE0803E_ ADD_USCOR
ODE0P001_ CONVERSE
OD0EEE4E_ CMD_PARSE
OD00E700_ ERR_LOG
ODE0E200_ INQ_PROC
OD008042_ TRAN_PF
OD00P700_ ADD_ERR
OD80P200_ INQ_REC

IBM'S AD/Cycle

CROSS
LIFE
CYCLE

Process/Project
Impact Analysis

Documentation

Requirements	Analysis/Design	Produce	Build/Test	Production

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

User Interface
Workstation Services

APPLICATION DEVELOPMENT PLATFORM

Repository Services
AD Information Model

IBM'S AD/Cycle

CROSS LIFE CYCLE	Process/Project Impact Analysis	Documentation

Requirements	Analysis/Design	Produce	Build/Test	Production

[redacted]

MAINFRAME

[redacted]

[redacted]

WORK STATION

[redacted]

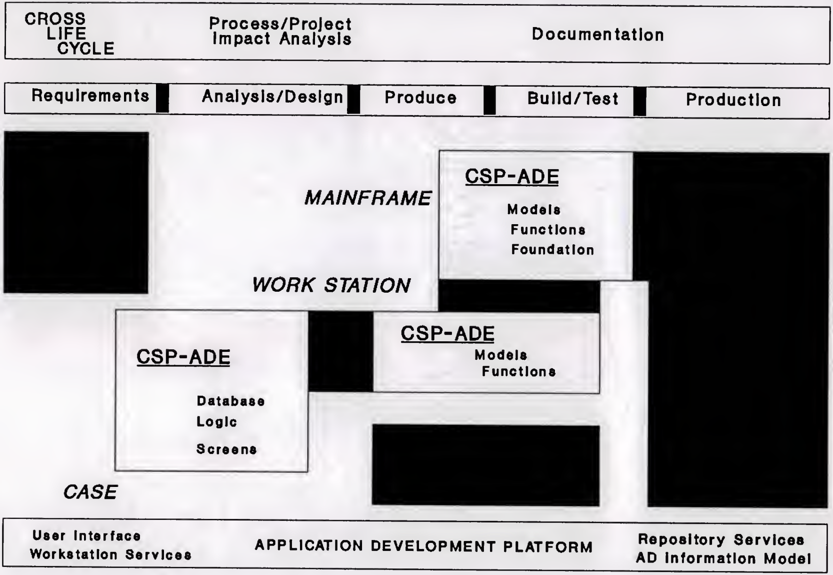
[redacted]

CASE

[redacted]

User Interface Workstation Services	APPLICATION DEVELOPMENT PLATFORM	Repository Services AD Information Model

CSP/ADE AD/Cycle Influence



CROSS LIFE CYCLE

Process/Project Impact Analysis

Documentation

Requirements

Analysis/Design

Produce

Build/Test

Production

MAINFRAME

CSP-ADE

Models
Functions
Foundation

WORK STATION

CSP-ADE

Models
Functions

CSP-ADE

Database
Logic
Screens

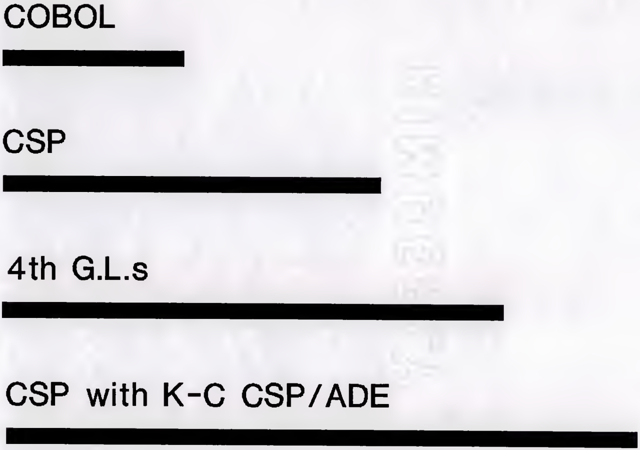
CASE

User Interface
Workstation Services

APPLICATION DEVELOPMENT PLATFORM

Repository Services
AD Information Model

Relative Application Development Productivity



Reactions To K-C CSP/ADE

Local
- **Advisory Group** - Demo'd - CSP users
  - Color Tile - wouldn't cancel lic.
  - Fina - could commit to CSP
  - Niemann Marcus
  - Transport Insurance
  - GE Consulting Services

- **IBM**
  - **Marketing**
  - **Cary Labs** Larry Clark - CSP strategist - experts in CSP
  - **Vendor Loan Review Committee** - 2-3 yrs ahead
  - **SEs** - talking about tools
    - ADP
    - Diamond Shamrock
    - Clark Checks

addresses
All known
issues

- **Kimberly-Clark "Oasis Project"**

to use for 40 MIP appl

Impact Of Addressing Issues

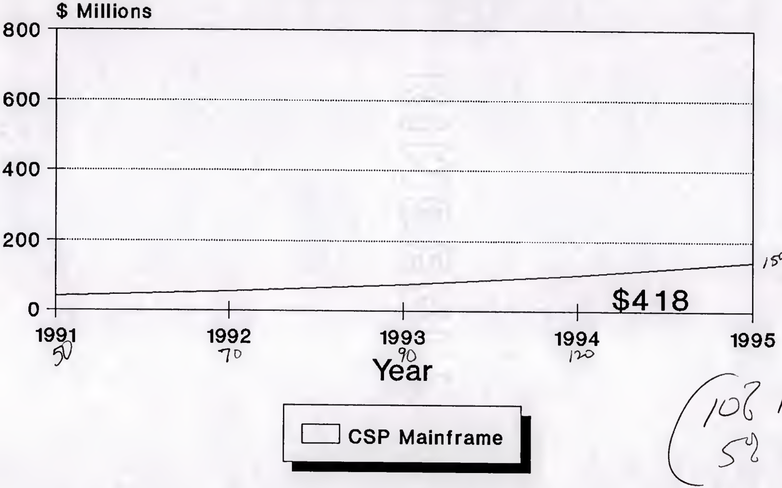
- Acceptance Of CSP
- vs KW ? Earlier Implementation Of AD/Cycle
- Earlier Movement To SAA
- Additional DB2 Utilization

Solution To CSP & AD/Cycle Issues

K-C CSP/ADE - The Application Development Enabling software that should be delivered with every copy of CSP installed.

CSP - BASELINE

Annual Revenue



Cum ??

10% main
5% price inc

Financial Impact On IBM

- Increase Selling Price of CSP
- Increase Market Acceptance of CSP

Change In Mainframe Software Revenue
Over Five Years

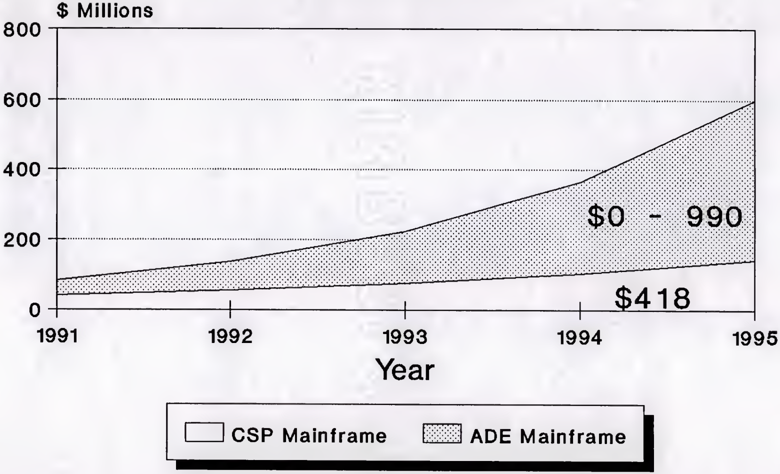
$ Millions

		Percent Increase In CSP Growth Rate				
		0%	5%	10%	15%	20%
Percent Increase In CSP Selling Price	0%	0	26	53	80	109
	5%	135	169	202	238	274
	10%	297	340	382	427	472
	15%	491	545	597	653	709
	20%	721	787	852	920	990

IBM Baseline Revenue = $418 Million

K-C CSP/ADE

Annual Revenue



Change In Total Software Revenue

Over Five Years

$ Millions

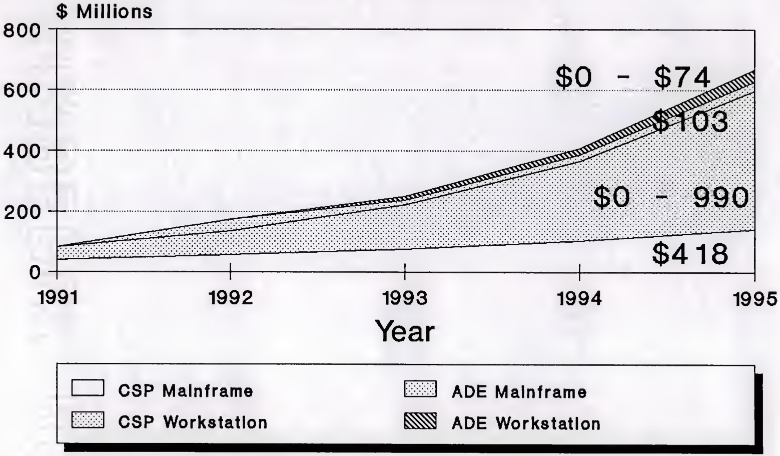
plus PWS impact

Percent Increase In CSP Selling Price	Percent Increase In CSP Growth Rate: 0%	5%	10%	15%	20%
0%	0	27	54	83	112
5%	150	185	219	256	293
10%	329	372	416	461	508
15%	541	596	649	706	763
20%	791	858	924	993	1,064

IBM Baseline Revenue = $521 Million

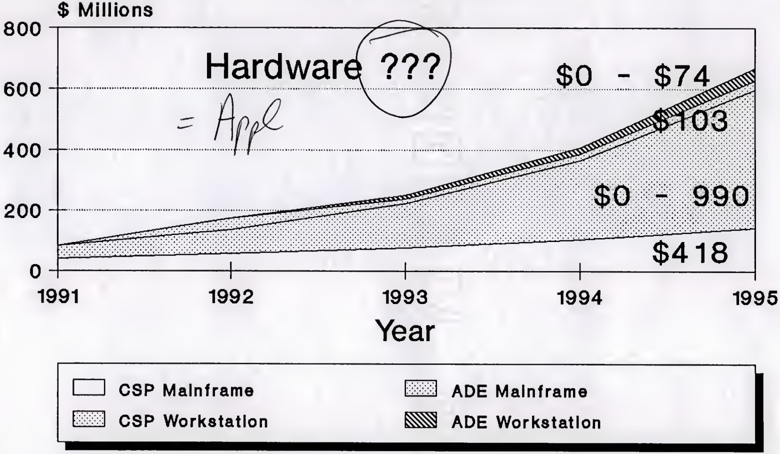
K-C CSP/ADE

Annual Revenue



K-C CSP/ADE

Annual Revenue



K-CCS's Proposal

- K-CCS Sells K-C CSP/ADE To IBM
- K-CCS Delivers Source Code (WS & PWS) And Documentation
- IBM Offers K-C CSP/ADE As An IBM CSP Component Priced Separately
- IBM Maintains Code
- K-CCS Consults On Maintenance
- K-CCS Consults On Training
- ✱ K-CCS Participates In Downstream Consulting

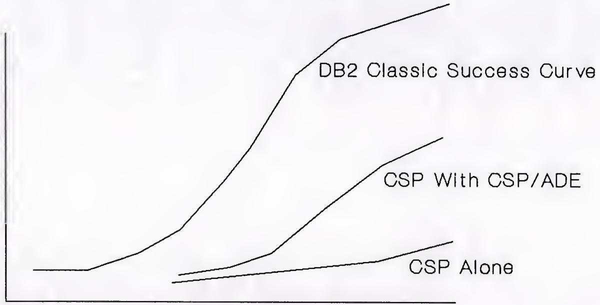
↳ Corp ??
Cust

Financial Proposal Structure

- **Upfront Payment**
  Source Code
  Documentation
- **Consulting Fees**
  Integration Into IBM
- **Royalty For Each License**
  Mainframe
  Work Station
- **Downstream Consulting**

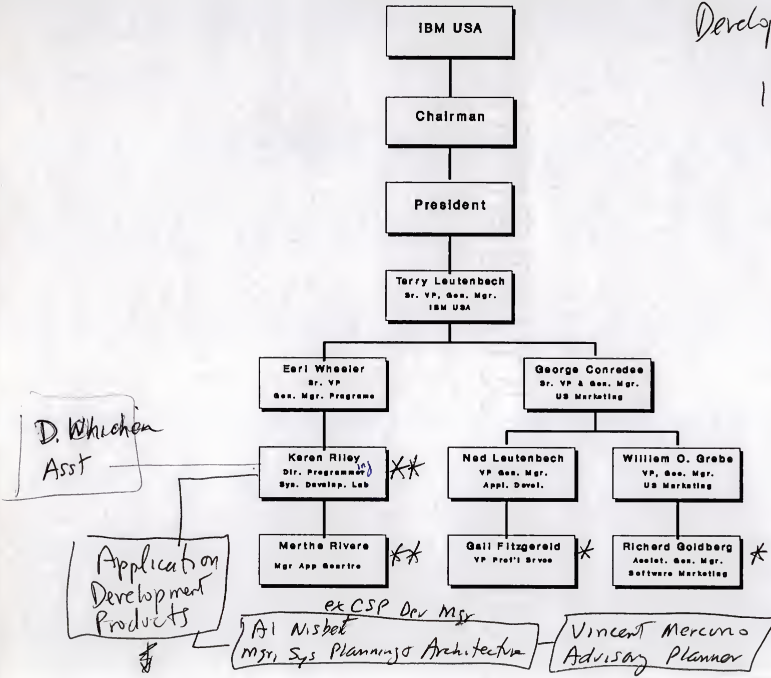
Solution To CSP & AD/Cycle Issues

K-C CSP/ADE - The Application Development Enabling software that should be delivered with every copy of CSP installed.



IBM Organization

(SW Mkting & Development
12/90



IBM USA

Chairman

President

Terry Lautenbach
Sr. VP, Gen. Mgr.
IBM USA

Earl Wheeler
Sr. VP
Gen. Mgr. Programs

George Conrades
Sr. VP & Gen. Mgr.
US Marketing

D. Whichen
Asst

Karen Riley **
Dir. Programmer ing
Sys. Develop. Lab

Ned Lautenbach
VP Gen. Mgr.
Appl. Devel.

William O. Grebe
VP, Gen. Mgr.
US Marketing

Application
Development
Products

Martha Rivera **
Mgr App Centre

Gail Fitzgerald *
VP Prof'l Srvcs

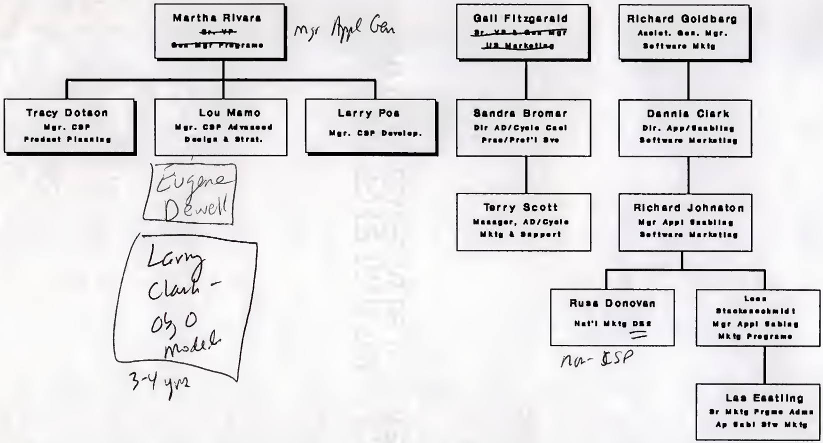
Richard Goldberg *
Assist. Gen. Mgr.
Software Marketing

ex CSP Dev Mgr
Al Nisbet
Mgr, Sys Planning & Architecture

Vincent Mercurio
Advisory Planner

ex-Product Administrator
Appl Dev Tools

IBM Organization



Martha Rivera
~~Sr. VP~~
~~Gen Mgr Programs~~

Mgr Appl Gen

Tracy Dotson
Mgr. CSP
Product Planning

Lou Mamo
Mgr. CSP Advanced
Design & Strat.

Eugene Dewell

Larry Clark - Ob, O model

3-4 yrs

Larry Poe
Mgr. CSP Develop.

Gail Fitzgerald
~~Sr. VP & Gen Mgr~~
~~US Marketing~~

Sandra Bromer
Dir AD/Cycle Cnsl
Proc/Prof'l Svc

Terry Scott
Manager, AD/Cycle
Mktg & Support

Richard Goldberg
Assist. Gen. Mgr.
Software Mktg

Dennis Clark
Dir. App/Enabling
Software Marketing

Richard Johnston
Mgr Appl Enabling
Software Marketing

Russ Donovan
Nat'l Mktg DB2

non-CSP

Leon Stockenschmidt
Mgr Appl Enbling
Mktg Programs

Les Eastling
Sr Mktg Prgms Admn
Ap Enbl Sfw Mktg

NEW ADDRESS
INPUT
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400 Frank W. Burr Boulevard
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CASE-related info

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Thomas O'Flaherty
Vice President
INPUT - New York

CAPABILITIES

- Design and manage research projects for determining market needs, competitive positioning, and the viability of products and services.

- Provide consulting advice on market strategy, new products and services, growth/diversification alternatives. Two systems initiatives added $13 million and $21 million to the bottom line.

- Experience includes over 100 research and consulting assignments for clients ranging from start-ups to firms such as ADP, Ameritech, AT&T, Citicorp, Continental Insurance, Coopers & Lybrand, General Motors, GTE, IBM, ITT, Marriott Corporation, McKinsey & Co., Metaphor, Mobil, and Unisys.

- In-depth experience in many vertical markets (e.g., worked with a major bank for a year on a new processing strategy; advised the President of a major manufacturing division on system improvements; developed innovative information services for the medical sector; advised an energy company on information service diversification into related fields).

BACKGROUND

- Director of Research, Broadview Associates. Responsible for professional support functions (company analysis, client consulting, proprietary data base development) for an international investment banking specializing in information technology.

- Principal, Information Service Strategies. Consultant on markets and products. Marketing director for start-up firm offering innovative PC communications product.

- Principal Consultant, INPUT. Directed research and consulting projects for a variety of clients.

- Hands-on experience at every IS department level, including IS Director.

EDUCATION/PROFESSIONAL ACTIVITIES

- B.A., Colgate University

- Certificate in Data Processing (CDP)

- Member of the ACM, the Society for Information Management, and a founding member of the American Association for Medical Systems and Informatics. Extensive speaking to professional groups.

- Regular contributor to *Computerworld* Softline column since 1983.

Thomas O'Flaherty
Vice President
INPUT

CASE-Related Experience

- Hands-on experience at all levels of IS
- Design and implementation responsibilty for many systems projects (including a successful large scale AI project implemented using COBOL and IMS)
- Regular contributor to Computerworld's Softalk column since 1983
- Lectured at IBM Software Engineering Institute
- Recent CASE professional activities:
  - Presentation at 1989 CASECON
  - Speaker at executive session of largest CASE vendor's user conference
  - Conference presentation on "CASE and Systems Integration"
  - Speaker at 1990 Adapso World Computing conference at CASE session
  - CASE analysis article published in the July/August, 1990 "Software Engineering"
  - Chaired "CASE Futures" panel in August, 1990 with senior presenters from IBM, DEC, Index, and Texas Instrument
- In the last year reviewed the operations of ~~two~~ three CASE product companies (both in the top ten) and made recommendations which were implemented
- In 1990 studied current and future developments in the real-time CASE market.

The New Playing Field

Computer-aided software engineering (CASE) is often viewed as a collection of concepts, methodologies, and technologies. Recent developments in the market, however, promise to change CASE products almost beyond recognition. The effects on CASE tool vendors will be obvious and immediate. The impact on those using or still assessing CASE, however, may be even greater in the long run. This column examines the current CASE product environment and the significant impact IBM's strategies and AD/Cycle repository have had and will continue to have on the CASE product environment.

In 1989, at least 150 vendors offered one or more CASE products for the US market. In interviewing several dozen vendors during that year, the author found that each agreed that the market cannot support such a large number. The very existence of so many vendors confuses users, delays CASE deployment and use, and prevents vendors from reaching critical mass (in monetary terms, this is equivalent to $10 million or greater annual sales). As a result of market diversification, Input (an international research and consulting firm specializing in information services based in Mountain View CA) estimates that CASE product vendors, as a group, average $3 million in annual sales.

Until recently, few barriers existed that prevented companies from entering many parts of the CASE product market. As a result, interesting front-end products were and still can be produced with a relatively small investment in programming resources; unfortunately, the resulting products often look and perform rather similarly. This ease of market entry encourages many small firms to try to solve pieces of the CASE problem, which in turn produces fragmented product offerings.

This situation has been quantified in the *CASE Product Directory* produced by CASE Outlook Inc in Portland OR. The directory analyzes the offerings of 130 CASE product vendors, categorizing vendor offerings by the following 17 functions:

- Requirements.
- Program design.
- Data base design.
- Real-time design.
- Rapid prototyping.
- Automatic code generation—Information systems.
- Automatic code generation—Engineering systems.
- Programming support.
- Testing.
- Strategic planning.
- Methodology.
- Configuration management.
- Requirements tracing.
- Project management.
- Testing and maintenance.
- Reverse engineering.
- Performance analysis.

An analysis of this data produced these key findings:

- No vendor had products that performed all 17 functions.
- The average vendor's CASE product line performed five of the 17 functions.

Because of the disparity between the number of vendors and the small number of functions

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Thomas O'Flaherty is vice-president in charge of the New York regional office of Input, an international research and consulting firm specializing in information services based in Mountain View CA.

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provided by their CASE tools, it can be easily deduced that more than four-fifths of the vendors in this market will fall by the wayside or have their products taken over by surviving vendors.

In addition to the issue of the number of vendors that will survive is the issue of the type of company that will survive—that is, will the reduced number of vendors still tend to be specialists, covering limited parts of the CASE life cycle, or will they cover most or all CASE functions?

Another concern that both vendors and users must face as the number of vendors becomes more concentrated includes what impact this concentration will have on the development of CASE (e.g., whether it will limit the options and approaches to CASE implementation that are available). A further issue connected to vendor concentration is what strategies CASE product buyers and users can employ to benefit from, rather than be hurt by, these changes.

These issues have been underscored by IBM's recent CASE-related announcements and actions, which are discussed in the following section. The section focuses on IBM because of the company's size and potential impact; strategic developments involving other vendors are discussed in subsequent sections of this column.

IBM's role in the CASE environment

Until recently, IBM has not been a principal factor in CASE technology or a major player in the CASE market. Discussions of IBM and CASE generally involved speculation regarding the long-awaited development of its repository.

In the last half of 1989, however, IBM entered the CASE arena with a vengeance as AD/Cycle (originally released as AD), a set of tools that includes its new repository product, was announced in September. In addition to this release, at the end of last year, IBM made equity investments in three of the leading CASE product firms—Bachman Information Systems Inc, KnowledgeWare Inc, and Index Technology Corp.

IBM has been uncharacteristically forthright with regard to the product's contents and, to a degree, its direction and strategy. Because of the extensive press coverage of this product, this article will not recapitulate the AD/Cycle product announcement or elaborate on the product itself.

AD/Cycle's importance lies outside of the product details in that it promises to change, or accelerate changes already occurring in, the CASE environment through the following characteristics:

- The operating environment.
- The host machine.
- The interaction of the components.
- The product's visibility.

The operating environment. The most important operational attribute of AD/Cycle is that it is designed to operate in a layered, workstation environment. Indeed, IBM representatives have indicated that much of the product's functional capabilities could have been delivered two years earlier if the chosen environment had been a host linked to dumb terminals.

The host machine. The workstations play an important or even dominant role in the analysis and design phases; the host machine is vital for overall control as well as serving as the focal point for integrating design components from decentralized design teams. Host machines include but are not limited to the 370 family; in many ways, the architecture of the AS/400 is an even more suitable platform for the repository.

Interaction. To the extent feasible, all the components of AD/Cycle will be interactive. For example, validation and error checking of design will take place in real time.

Visibility. In many respects, AD/Cycle has become the most visible part of IBM's Systems Application Architecture (SAA), building on its very expensive common interface foundation.

The most important aspects of AD/Cycle (and, perhaps, the reason why the term *cycle* was added to its name) are its facilities to maintain and migrate older systems to newer systems. This capability is vitally important to the CASE industry: if the widespread use of CASE tools causes the disposal of old code, CASE will take a very long time to reach the mainstream. Of course, Bachman offers a way

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to apply a CASE methodology to current systems (e.g., data bases). Some Bachman tools can be used not just for data base design but also for migration from old systems to new (e.g., from IMS to DB2).

The move to an expert generator

The Bachman data base–oriented tools alone will not be enough to meet maintenance needs. After all, 80 billion lines of COBOL code are still in use. IBM's Cross System Product (CSP) will offer COBOL and IMS generation based on design tool output by the end of this year. These facilities, however, will in many respects make the IBM product only equal to competitive generators.

The promise of this product is in the future. CSP is in the midst of a drastic renovation, to the point where it might almost represent a whole new product in the future. IBM has often used the phrase "rule-based, AI-optimized COBOL" to describe what CSP will produce after 1990. There is little doubt that IBM is aiming for an expert generator. In the future, the expert generator could perform several functions:

- The generation of optimized object code—In principle, this code could be geared toward various hardware architectures. For business reasons, however, IBM would limit the target hardware platforms to those it controlled.
- Degeneration—The extraction of design and requirement parameters from existing COBOL code and their placement within the structure of a specified design tool—Thereafter, in principle, the old code could be maintained through the design tool. In fact, from one viewpoint, it would no longer be old code.
- Inclusion of the code generator as part of the design tool and repository—That is, if CSP or subsequent products develop this far. Therefore, the code generator would become transparent. In a way, the design tool would become the generator.

IBM's relationship with vendors

The repository itself is meant to be an open architecture with defined interfaces that other software vendors can link into and use. IBM has already formed relationships with about 40 vendors, called development associate vendors. These vendors will be regularly briefed on the repository and its interfaces. They and their products are listed and referred to by IBM. According to various publications, IBM has an equally positive attitude toward all of these vendors because the development associate vendors will ensure AD/Cycle's acceptance and success.

In reality, however, of the 40 vendors with whom IBM has this relationship, those in which it has made an investment are more important and are treated differently. Vendors with an equity investment are referred to as close vendor-partners. They will receive a much more intensive and earlier look at IBM's plans and directions than will IBM's other vendor associates. Of equal importance, at least at this time, the vendor-partners' offerings are presented to customers as being part of the AD/Cycle offering itself.

It is outside the scope of this article to analyze all the reasons why IBM entered into these equity-based partnership arrangements. Particular motivations that relate to CASE include the need for standards, communication of requirements, partnership protection, product choice for customers, and competition.

Standards. IBM views the setting of standards, especially those for the visual representation and digital storage of requirements, as one of the most important factors for increasing the effectiveness and use of CASE. By working with and investing in its vendor-partners, IBM will carry out part of this strategy.

Communication of requirements. Equally important is the fact that IBM has specified the object-oriented entity-relationship model as the means of communicating requirements to AD/Cycle (as well as the form in which information will be stored). IBM has the influence and has supplied the resources to ensure that this is implemented by its vendor-partners.

Partnership protection. IBM's investment makes it more difficult for its partners to be taken over. Undoubtedly, provisions were made in the agreements between IBM and its senior partners that IBM, at its option, can cut off the flow of information and support in the event of a change of ownership. This kind of protection helps both IBM and its customers

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to be able to rely on the vendor's stability during the relatively lengthy time period that CASE implementation requires.

Product choice of customers. IBM has selected well-managed, financially strong companies as partners. It could have chosen weaker companies that were equally proficient technically and more easily controlled. In choosing the stronger companies, at least for the medium term, IBM wishes to provide its CASE customers with a choice of products from independent firms.

Competition. The vendor-partner offerings overlap somewhat, both with each other as well as with those IBM has announced or has under development. This means that not only will customers have choices but competition will be maintained.

IBM's priorities and strategies

Allowing and supporting this diversity underlines IBM's priorities. First, IBM wants to ensure that a full set of AD/Cycle-conforming tools is available as soon as possible. Second, as long as IBM controls the repository, it is willing, in the medium term, to share revenue generated from its partners' software and services. Third and above all, IBM wants to solve the applications development backlog so its customers can once again buy hardware for new, strategic applications.

IBM's AD/Cycle strategy is basically software driven; the strategy will have the sale of more hardware as one of its objectives. AD/Cycle is geared primarily toward IBM's installed base, hence the reliance on the MVS and OS/2 operating environments. Although IBM's new reduced instruction set computing (RISC) processors provide much more power, it is unlikely that they will be supported by AD/Cycle in the near future because of the effort involved.

The integrated approach to CASE

IBM's actions have created a new CASE playing field, not a perfectly level one, but one that tilts in IBM's direction. But that is the price the industry paid for allowing IBM to set standards. Presumably, a more rapidly growing market will benefit vendors other than IBM.

All of IBM's actions have tipped the scales from the independent CASE tool approach to the integrated approach. IBM has not been the leader, however, in the integrated approach. In essence, it has ratified previous actions of other CASE vendors. The following are some examples of vendors and the strategies they used before IBM's appearance in the market:

- Generator vendors Sage Software Inc and Pansophic Systems Inc added to their products' capabilities through acquisition.
- Texas Instruments Inc offered its integrated Information Engineering Facility (which implements the James Martin approach)—KnowledgeWare Inc has a similar implementation.
- Front-end vendor Nastec Corp and back-end vendor Transform Logic merged in late 1989.
- DEC announced its own repository approach in 1989.
- In late 1989, Computer Associates Inc announced an advanced code generator that complements the other applications development products in its acquired Cullinet user base.

In addition, Exhibit 1 is a summary list of vendors who offer end-to-end CASE products.

What about the other 100 or so CASE vendors? Those that are small and without a strategic product will have limited choices if they want to remain effective enterprises. They can remain effective by developing better products ahead of the competition (including

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Exhibit 1. *End-to-End CASE Product Vendors*

Hardware Companies
DEC
IBM
Texas Instruments

System Software Companies
Computer Associates
Pansophic
Oracle[1]
XA Systems[2]

Independent CASE Product Vendors
Nastec/Transform Logic
Sage Software

Professional Service Providers
Andersen Consulting
Oracle

Notes:
[1] Part of Oracle Complex System; therefore, also under "Professional Service Providers."
[2] Still retains relationships with Peat Marwick.

SOURCE: Input, an international research and consulting firm specializing in information services in Mountain View CA.

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being a research and development shop for other CASE vendors), finding a strong partner (e.g., through acquisitions), or becoming a CASE-expert professional services firm (and, in essence, dropping out of the products business).

With so many vendors in the market, it might seem as if this column pays a disproportionate amount of attention to IBM's CASE initiatives and strategies. The reality is—for better or worse—that most IS departments, which are mainframe-oriented, are responsible for most major application development projects, and these kinds of IS departments and IBM are still largely independent.

Application development approaches

IBM, as well as other vendors, has begun to offer the opportunity for an end-to-end integrated CASE environment. How many organizations will take advantage of the opportunity and at what rate of speed? To help answer these questions, the approach organizations take can be classified into one of three categories:

- The do-nothing approach.
- The assessment approach (including pilot implementation).
- The full implementation approach.

Larger companies that are still in the do-nothing category are generally special cases. For example, they are in severe financial difficulty, have been decentralized into units too small to have the critical mass to support CASE study, or are in turmoil (including those being acquired or divested). The do-nothing approach can make sound business sense because CASE requires a multiyear time frame, and these kinds of organizations often work on a monthly basis. Improvements to CASE tools alone will generally have little or no impact on this group of companies.

The primary impact will be on the other groups. Assessors will have far less reason to stay indefinitely in the evaluation or pilot mode, searching for the right product. They will have to make some difficult decisions. Up till now, the full implementers have been in short supply because of technical risk (i.e., the chance that the product will not work) and vendor risk (i.e., the chance that the vendor may not be in business in a year). The issues may become those of typical business risk, such as:

- Does the system address a real business need?
- Does the system give the company a competitive advantage?
- Are all affected operating units really on board—What is the return on investment for the system?

Including maintenance in the approach

The preceding strategies implicitly address new development. A successful, fully integrated approach (e.g., the potential reengineering aspects of AD/Cycle) would go beyond this and integrate maintenance into systems development. Maintenance, as it is currently defined, is in bad shape: its practitioners usually have one of the most difficult, least rewarded jobs in an IS department. They are forced to work by intuition and master the art of obscure deductions. Using a broad definition of the term, maintenance can expend well over half the resources in most IS departments, drastically interfering with their ability to develop more important systems.

An end, or even a blurring, of the distinction between new development and maintenance would permit many more IS resources to be devoted to solving business problems. At present, however, this kind of reengineering should be treated with caution; IS departments will probably remain assessors for some time with regard to radical reengineering.

Remaining questions

Although some of the changes in the CASE environment and their effects are becoming more known, the software engineering industry must resolve numerous issues before the use of CASE moves closer to becoming a guaranteed success. The major unresolved issues include:

- What are the preconditions for successful CASE implementations? Are there factors that virtually guarantee failure in implementing CASE?
- Will users actually switch to end-to-end products? If so, how soon will this occur?
- What proportion of success depends on the CASE tools and what proportion depends on how tools are used?

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- How can CASE (as it is commonly understood) be effectively linked to business planning?
- What are the current gaps between corporate CASE needs and vendor offerings—That is, are the gaps perceived in the same way by prospective customers, existing customers, and vendors? Which gaps are the most serious? How near are the gaps to being closed (from the standpoint of both perception and reality)?
- How will the successful use of CASE affect the position of IS operations in an organization?
  - —Will IS be more involved in developing corporate plans and objectives?
  - —How much will the reality of evolutionary system change be able to help other departments meet their objectives?
  - —Will more corporate resources be devoted to systems development and implementation?
  - —Will system resources be used more efficiently and effectively?
  - —Will there be increased responsiveness in meeting corporate needs?
- What level of investment will be required to achieve critical mass as a CASE implementer? For example, what proportion of the investment is used for various tools, specialized staff, internal training, and external consulting, among other resources?
- Has CASE already changed the composition and proportion of tasks in the systems development life cycle? What are the main variables? What further changes lie ahead over the next five years?
- How will CASE affect and be affected by such existing tools as fourth-generation languages, nonrelational DBMSs, and spreadsheets?
- Will future generations of CASE tools and concepts bridge or widen the gaps between different hardware architectures?
- To what extent will a next generation of application packages built with CASE tools that allow customization by the user be available? Do organizations need—and are they ready for—such offerings?

Some of these issues are only indirectly technical in nature. It may be that as the industry comes closer to finding solutions to technical CASE problems, business and general systems issues will become more visible and more important. Such hypotheses remain to be tested. ▲

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INPUT Research Bulletin

A Publication from INPUT's Market Analysis Program

The Role of Third Parties in IBM's Software Strategy

NOTE: This MAPS Research Bulletin is the second in a series devoted to IBM and its software strategy. Based on extensive research conducted by Tom O'Flaherty, Vice President in charge of INPUT's New York office, these bulletins will cover IBM's previous software strategy, the position of software in its emerging solution strategy, the key role of applications development, partnering strategies, and the responses available to vendors.

In an earlier Research Bulletin, INPUT outlined and analyzed the counterproductive effects of IBM's DB2 product strategy. Tactically, DB2 succeeded in becoming the premier DBMS (at least in the MVS environment); strategically, however, the disruption DB2 caused in application-building contributed to a slowdown in large systems sales.

DB2 is one example of IBM's historic *product* orientation toward software. Similarly, MVS and PC/DOS, though enormously successful in their own ways, have had at best only a marginal effect on IBM's bottom line:

- MVS license costs are now just considered an overall part of doing business by the more sophisticated customer (see Exhibit 1).
- PC/DOS and MS/DOS brought standards and order to the personal computer. From IBM's standpoint, however, this only served to commoditize the platform without IBM gaining real control over the operating system.

Ironically, IBM's past emphasis on systems software brought it further away from its key target: the user. Gaining more influence over the various types of customers has become a recent preoccupation of IBM.

Exhibit 1

Components in the Cost-of-Ownership Equation

Cost of system ownership = Initial hardware cost
+ Financing
+ Operating system license/maintenance
+ Systems software license/maintenance
+ Customer service

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Applications Solutions

It is no coincidence that applications have become a key focus for IBM; hence, the importance of the Applications Solutions Division line of business. To oversimplify slightly, more solutions to business problems will lead to more hardware being sold (Exhibit 2). Software is of course a key (if not *the* key) component in any solution-oriented delivery mode.

Applications can be supported in a variety of ways:

- Application Software Products
  - standard packages
  - customized packages
- Vendor-Developed Applications
  - professional services
  - systems integration
  - turnkey systems
- In-house System Development
  - standard approaches
  - with application-enabling tools
- Systems Operations (for applications now running in-house)
- Transaction Processing Services (as an alternative to the above)

Obviously, not even IBM can (or probably should) offer the full range of application-enabling products and services. IBM's own priorities are becoming clearer.

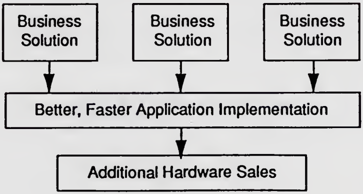
Application-enabling (CASE) tools and methodologies are a very important area for IBM, as exemplified by the resources and emphasis placed on AD/Cycle. Quite simply, IBM must bring order to this area if its customers are to begin to break their in-house development logjams.

IBM will also be supplying *services*: systems integration, professional services, systems operations, and to some extent, transaction processing services.

- Although IBM has not yet had the success it hoped for in commercial systems integration, systems integration projects are so large, visible, and in many cases strategic, that IBM will continue to pursue them by means of various organizational arrangements.
- Professional services, recently decentralized into its regions and branches, will be useful in implementing customer systems. However, IBM will tend to be handicapped by its cost structure in what is often a commodity-like business.

Exhibit 2

IBM Solution-Directed Strategy


Business Solution
Business Solution
Business Solution
Better, Faster Application Implementation
Additional Hardware Sales

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- Systems operations—essentially undertaken as a defensive move by IBM—will become more important as outsourcing increases. Here too, IBM is somewhat handicapped by its cost structure and personnel practices. For example, what does IBM—with its no layoff policy—do if a systems operations contract is not renewed?

- IBM will offer its own applications software in certain central areas (e.g., its recent purchase of CADAM from Lockheed). However, IBM's previous applications software offerings have been of mixed quality; more importantly, IBM does not have the knowledge or resources to support more than a few vertical niche/application platform combinations.

Consequently, IBM will be working with a variety of third parties. This includes vendors in which IBM has made an equity investment (vendor partners), as well as vendor associates (vendors that have agreed to conform to SAA).

Several types of vendors will play an important role in IBM's applications strategy:

- CASE vendors will play a critical role in the near term. although they will be somewhat less important as IBM gears up its own AD/Cycle products.

- Applications software products offered by third parties will be critical to IBM's strategy. Customized packages will come into their own by the mid-1990s as more applications products are built using AD/Cycle tools. This will allow corporations—or their information service vendors—to tailor a product for a particular environment.

- IBM will increasingly rely on allied professional service and system integration firms to meet IBM customer needs; these allies will usually have a functional, vertical, or geographic specialization. In addition, IBM allies will often be able to deliver a more cost-effective solution. All things being

Exhibit 3

Importance of IBM and Third-Party Roles in IBM's Applications Strategy

Product Service Supplier	Application-Enabling (CASE) Tools	Application Software Products		Services			
		Package	Semi-Custom	Prof. Svc.	Sys. Integ.	Sys. Ops.	Trans. Proc.
IBM	H	L/M	L	M	M	M	L
Third Parties							
1990	H	H	L/M	M/H	M/H	M	M
1995	M	H	H	H	M/H	M	M

Key:
H = High importance
M = Medium importance
L = Low importance

Source: INPUT assessment

//

equal, IBM will be somewhat cooler toward systems integrators (as opposed to professional service firms), since they may recommend non-IBM hardware solutions.

- Since system operations and transaction processing have a somewhat lower priority in the IBM scheme of things, IBM's relationship with third parties in these areas will be more distant.

Exhibit 3 summarizes INPUT's assessment of the importance placed by IBM on the various roles which IBM and third parties will play in providing application solutions.

Of particular significance to third parties is the changing importance of some of their roles. (Note the increased importance of semi-customizable software products as CASE technology takes hold.)

IBM's Changing Attitude Toward Software Product Suppliers

Many software products do not directly provide or enable application solutions. Basically, all non-CASE systems software falls into this category. What is IBM's attitude toward these software products?

In the past, the answer was relatively straightforward:

- IBM wanted producers of IBM-compatible core system software (operating systems and utilities, communications software and DBMSs) to cease to exist.
- Application development tools (4GL, early CASE, decision support) and data center management tools were viewed neutrally—they were neither helped nor opposed.

IBM's attitude is now more discriminating:

- Application-enabling tools are now viewed more positively as a class, with AD/Cycle-*conforming* tools at the top and AD/Cycle-*competitive* tools almost as low as operating systems.
- System building blocks such as DBMSs and communications software are now tolerated.

The situation will become more complex in the future as SAA becomes more important for both IBM and its customers. (This includes the AD/Cycle subset of SAA.) Vendors whose products do not conform to SAA will become second class citizens; this even includes (up to a point) vendors of applications packages.

Exhibit 4 summarizes the relative position of major types of third-party software over a ten-year period. Few categories will have escaped significant changes in IBM's attitude over the ten years. This reflects IBM's changing strategies and its efforts to become more solution- and service-oriented.

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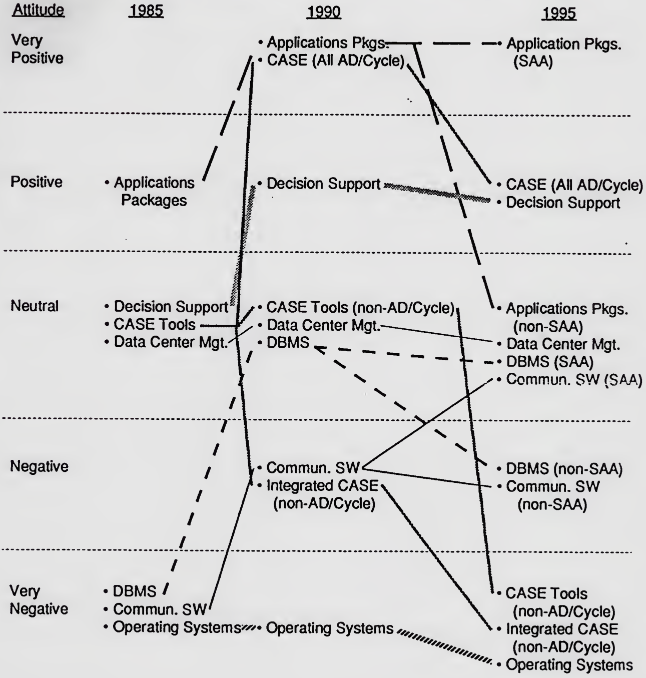
Exhibit 4

IBM's Changing Attitude Toward Third-Party Software



This Research Bulletin is issued as part of INPUT's Market Analysis Program. If you have questions or comments on this or other bulletins in this series, please contact your local INPUT office or Norman Litell, Market Analysis Program Director, at INPUT's headquarters in Mountain View, California: (415) 961-3300.

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KCCS Spe Study

Demand

- Add'l growth
  - as is CSP
  - AD/Cycle CSP
- Addl price
  - Know CSP?
  - Awaiting What

20 + 20

curr CSP Lic   no gen

Q - ①

40/4 = 10/ = ⑤

Tab	1
An	2
Prep	2
Pres	1
Rpt	2
	14 = 20/25

Vendors/experts

What organic "enhancements" to CSP would negate KC tools?

How likely?
When?
How complete?

* KW